

DIVISION 1 – GENERAL REQUIREMENTS

Section 01450: Quality Control

SECTION 01450: QUALITY CONTROL

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. This section describes the Contractor's quality control requirements, duties, and responsibilities during execution of the work. The intent of this section is to require the Contractor to establish a necessary level of control that will:
 - 1. Adequately provide for the production of acceptable quality materials and constructed features.
 - 2. Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements are and have been met.
- B. The Contractor shall establish, provide, and maintain a Construction Quality Control (CQC) Plan as specified herein, detailing the methods and procedures that will be taken to assure that all materials and completed construction elements conform to Contract Plans, Specifications, and other requirements, whether these elements be manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the technical Specifications, it is the responsibility of the Contractor to ensure that construction and construction quality controls are accomplished in accordance with the stated purpose and Specifications as described herein.
- C. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQC Plan has been reviewed and approved by the Engineer. No partial payment will be made for materials subject to specific quality control requirements until the CQC Plan has been reviewed and approved.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01450: Quality Control

- D. Quality control requirements contained in this section and elsewhere in the Contract technical Specifications are in addition to and separate from any acceptance testing requirements. Acceptance testing requirements are the responsibility of the Engineer. The Contractor shall cooperate fully in facilitating the sampling and inspection necessary for an effective acceptance testing program by the Engineer.

1.02 SUBMITTALS

The Contractor shall be responsible for the following submittals:

- A. CQC Plan (including Inspection and Test Plan)
- B. Daily CQC Reports (including Daily Inspection Reports, and Daily Test Reports)
- C. Certified test reports

PART 2 – PRODUCTS

Products that are used to accomplish or are incorporated into the work of this section shall be as selected by the Contractor, subject to approval by the Engineer.

PART 3 – EXECUTION

3.01 CONTRACTOR QUALITY CONTROL PROGRAM

The Contractor shall establish a Quality Control Program to perform inspection and testing of all items of work required by the technical Specifications, including those performed by subcontractors. This Quality Control Program shall ensure conformance to applicable Specifications and Plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical Specifications, in addition to other requirements of

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.

3.02 CONTRACTOR QUALITY CONTROL (CQC) PLAN

- A. The Contractor shall describe the CQC in a written document titled “Contractor Quality Control Plan,” which shall be submitted to the Engineer no later than 10 days prior to the start of any clearing, excavation, backfilling, capping, or construction. The CQC Plan will be used to document inspections, monitoring, surveys, and other actions to be taken by the Contractor to ensure that the work complies with all Contract requirements.
- B. The CQC Plan shall demonstrate the Contractor’s understanding of the total Quality Control requirements of the Contract and generally how these will be utilized to control all processes within material/construction tolerances and acceptance criteria.
- C. The CQC Plan shall be organized to address, as a minimum, the following items:
 - 1. General requirements.
 - 2. Quality control organization.
 - 3. Inspection and testing requirements.
 - 4. Inspection and test plan.
 - 5. Documentation of quality control activities.
 - 6. Requirements for corrective action when quality control and/or acceptance criteria are not met.
- D. The Contractor is encouraged to add any additional elements to the CQC Plan deemed necessary to adequately control all production and/or construction processes required by this Contract.
- E. Control of Non-conforming Items:

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

The CQC Plan shall include a non-conformance procedure that provides for the identification, documentation, disposition and control of non-conforming items, and identifies the responsibilities for preparation, review, approval, and implementation of the proposed resolution.

F. Control of Measuring and Test Equipment:

The CQC Plan shall establish a system for the calibration, maintenance, and control of measuring and test equipment used by Contractor during construction. Procedures shall provide for the identification of each instrument or equipment item that requires calibration or checking, and the establishment of a calibration system based on elapsed time or usage cycles.

Records of calibration shall be traceable to nationally recognized standards; otherwise, the basis for calibration shall be established and documented. Calibration standards used must meet the accuracy tolerance recommended by the manufacturer of the equipment being calibrated.

G. Supplier Quality Control:

The CQC Plan shall establish a system for the evaluation and selection of suppliers of material, items and services. The system shall include:

1. Documented review and assessment of potential suppliers' quality system.
2. Development of specified evaluation criteria.
3. Inclusion of applicable quality criteria in purchase documents.
4. Regular reviews and evaluations of suppliers' on-going quality performance.

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

- H. The CQC Plan shall describe the responsibility, authority and interrelation of all personnel who manage, perform, and verify work affecting quality. This shall include personnel who need organizational freedom and authority to:
1. Initiate the actions necessary to prevent the occurrence of non-conformances.
 2. Identify and record any product quality problems.
 3. Initiate, recommend or provide solutions through designated channels.
 4. Verify the implementation of solutions.
 5. Control further processing, delivery or installation of non-conforming material or items until the deficiency has been corrected.

3.03 QUALITY CONTROL ORGANIZATION

The CQC shall be implemented by the establishment of a quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel. The organizational chart shall be included in the CQC Plan. Qualifications of all proposed personnel and independent testing labs shall be documented and submitted in the CQC Plan.

The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

- A. The Contractor shall designate an individual within its organization who is responsible for overall management of the Quality Control Program and has full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the Contract Plans and technical Specifications. This individual, termed the CQC

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

Supervisor, shall report directly to a responsible officer of the construction firm and not to this Project's line management.

- B. The CQC Supervisor's qualifications shall be submitted to the Engineer for review and approval. At the option of the Engineer, the candidate(s) for CQC Supervisor shall be subject to interview by the Engineer prior to approval. The Contractor's approved CQC Supervisor shall not be removed or replaced without prior written approval by the Engineer.
- C. The CQC Supervisor shall have the authority to stop the work when and where deemed necessary to ensure compliance with the Contract Documents.
- D. The Contractor shall maintain a sufficient number of qualified Quality Control Personnel to adequately implement the Quality Control Program. The Contractor shall provide sufficient qualified Quality Control Personnel to monitor each work activity at all times. Quality Control Personnel shall report directly to the CQC Supervisor.

3.04 INSPECTION AND TESTING REQUIREMENTS

Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified herein.

- A. The CQC Plan shall establish a system for ensuring that all inspections are performed in accordance with the Inspection and Test Plan defined in Section 3.06. The Contractor shall use only inspection personnel who are independent of craft supervision and field Engineering to perform quality verification inspection and testing.
- B. The CQC Plan shall describe and specify control testing operations required to qualify, demonstrate, and/or ensure the quality and characteristics of items, site conditions, and/or the construction of

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

Contract required items. All testing shall be performed in accordance with the Inspection and Test Plan.

- C. Modifications, repairs, and replacements required as a result of test failures shall be treated as non-conforming items and shall be controlled in accordance with the controls for non-conforming items.
- D. Inspection and testing activities must be performed in accordance with procedures that may be supplemented by specific or standard instructions, work operations, or planning documents, including inspection Plans delineating inspection hold points. The inspection activities that shall be planned in advance include:
 - 1. Receiving inspection.
 - 2. Construction inspection and testing.
 - 3. Installation inspection and testing.
 - 4. Plant Inspections.
- E. Inspection and test activities shall have documentation reflecting the applicable inspections or tests performed. Inspection and test procedures and instructions shall provide:
 - 1. References to applicable documents, such as Drawings, Specifications, and procedures.
 - 2. Identification of prerequisites and special-process control requirements, such as personnel, procedure or equipment qualifications, suitable and controlled environmental conditions, and calibrated instrumentation.
 - 3. Identification of characteristics to be inspected.
 - 4. Identification of individuals or groups responsible for performing the inspection.

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

5. Acceptance and rejection criteria (explicit or by reference) obtained from Specifications, Drawings, supplier instructions, and/or construction standards.
 6. A description of the method of inspection and equipment to be used or reference to an appropriate procedure.
 7. Identification or frequency of inspection or sampling.
 8. Provisions for establishing mandatory inspection hold points for witness by the Engineer.
 9. Requirements that inspections of modifications, repairs, and replacements be performed in accordance with either the original inspection procedure, instruction, plan, special procedures or Plans appropriate to the work activity.
 10. Requirements that inspection and test records contain:
 - a) A description of the observation.
 - b) Record of the date and results of the inspection or test, including any special documentation and sign-off by the inspector.
 - c) Inspector identification.
 - d) Evidence as to acceptability of the results.
 - e) Verification that inspection or test operations are complete and acceptable.
 - f) Action taken to resolve any discrepancies noted.
 - g) Adequate documentation to demonstrate that the completed inspections or tests have met the objectives defined in the Inspection and Test Plan.
- F. Inspections shall be performed daily to ensure continuing compliance with Contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

1. During any plant operation for material production, quality control test results and periodic inspections shall be utilized to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical Specifications. All equipment utilized in proportioning and mixing shall be inspected to ensure its proper operating condition. The CQC Plan shall detail how these and other quality control functions will be accomplished and utilized.
2. During field operations, quality control test results and periodic inspections shall be utilized to ensure the quality of all materials and workmanship. All equipment utilized in placing, finishing, grading, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical Specifications and are within the plan dimensions, lines, grades, and tolerances specified. The Program shall document how these and other quality control functions will be accomplished and utilized.

3.05 PLANT INSPECTION

The Engineer or authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for acceptance of the material or assembly.

Should the Engineer conduct plant inspections, the following conditions shall exist:

- A. The Engineer shall have the cooperation and assistance of the Contractor and the producer Contracted for materials.

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

- B. The Engineer shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.
- C. If required by the Engineer, the Contractor shall arrange for adequate office or working space that may be reasonable needed for conducting plant inspections. Office or working space shall be conveniently located with respect to the plant.

It is understood and agreed that the Engineer shall have the right to re-test any material which has been tested and approved at the source of supply after it has been delivered to the site. The Engineer shall have the right to reject only material which, when re-tested, does not meet the requirements of the Contract, Plans, or Specifications.

3.06 INSPECTION AND TEST PLAN

- A. As a part of the overall Quality Control Program, the Contractor shall implement an Inspection and Test Plan, as required by the individual technical Specifications. The test plan shall include the minimum tests and test frequencies required by each technical specification item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.
- B. The Contractor shall prepare an Inspection and Test Plan that identifies all inspection and test activities required by the construction specification. The Inspection and Test Plan shall be included in their CQC Plan, and shall include:
 - 1. An itemized listing of inspection and test requirements.
 - 2. A reference of documents for each plan.
 - 3. Inspection and test methods employed in determining compliance.

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

4. Documentation requirements necessary to show evidence of compliance.
 5. Identification of the inspection or test status for work in process by using work sequence Plans, inspection or test records, tags, markings, or other devices compatible with the item, system, or operation being inspected or tested. Work sequence Plans shall identify hold and witness points for inspections and tests, which shall also be shown on the Project Schedule.
 6. Any other information or verification required to assure compliance with Contractual requirements.
 7. Verification that material marking is visible and correct material has been used.
 8. Specification item number (e.g., P-401):
 - a) Item description.
 - b) Test standard (e.g., ASTM).
 - c) Test frequency.
 - d) Control requirements.
- C. The Inspection and Test plan shall contain a statistically based procedure of random sampling for acquiring test samples in accordance with ASTM D 3665. The Engineer shall be provided the opportunity to witness quality control sampling and testing.
- D. All quality control test results shall be documented by the Contractor as specified herein.

3.07 DOCUMENTATION

- A. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

involved results of inspections or tests nature of defects, deviations, causes for rejection, proposed remedial action, and corrective actions taken.

- B. Specific Contractor quality control records required for the Contract shall include, but are not necessarily limited to, the following records:
1. Certified test reports for off-site testing and inspections shall be submitted in accordance with Section 01330—Submittals.
 2. Quality Control Records are those documents that have been reviewed and accepted by the Contractor as complete, correct and legible. Quality Control Records shall include the documents such as:
 - a) Drawings, Specifications, procedures used for construction, procurement documents, inspections and test records.
 - b) Submittals.
 - c) Personnel and procedure qualification records.
 - d) Material, chemical, and physical property test results.
 - e) Certificates of Compliance and shipment releases.
 - f) Supplier surveillance records.
 - g) Receiving inspection, storage, cleaning, and cleanliness control records.
 - h) Non-conformance reports and corrective actions.
- All Quality Control records shall be identified in the CQC Plan and maintained in the Contractor's job site files. The Engineer shall be provided access to these files when requested. Upon the completion of the Contractor's Contractual activities, these files shall be turned over to the Engineer.

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

Quality control records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the Contract. Legible copies of these records shall be furnished to the Engineer daily as specified below. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQC Supervisor.

3. Daily CQC Report. The Contractor shall prepare and maintain a Daily CQC Report of operations. The daily CQC report shall include a Contractor's Daily Construction Report, and shall be submitted on a daily basis to the City and the Engineer. At a minimum, information in the Daily CQC Report shall include the date, period covered by the report, equipment used, description of activity as identified by site coordinates, quantity of materials placed or installed that day and to date, downtime and delays to the operation, health and safety status, and other relevant comments concerning conduct of the operation. The report shall include the results of all inspections, surveys, and monitoring activities and shall be signed by the Contractor's Superintendent or CQC Supervisor. The Daily CQC Report shall also include the following elements:

- a) Daily Inspection Reports. Each member of the Contractor's quality control personnel shall maintain a daily report of all inspections performed for both Contractor and subcontractor operations on a form acceptable to the Engineer. These daily inspection reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:
 - i. Technical specification item number and description

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

- ii. Compliance with approved submittals
- iii. Proper storage of materials and equipment
- iv. Proper operation of all equipment
- v. Adherence to Plans and technical Specifications
- vi. Review of quality control tests
- vii. Inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed

The daily inspection reports shall be signed by the responsible quality control technician and the CQC Supervisor and shall be attached to the Contractor's Daily CQC Report.

- b) Daily Test Reports. The Contractor shall be responsible for establishing a system that records all quality control test results. Daily test reports shall document the following information:

- i. Technical specification item number and description
- ii. Test designation
- iii. Location
- iv. Date of test
- v. Control requirements
- vi. Test results
- vii. Causes for rejection
- viii. Recommended remedial actions
- ix. Retests

The daily test reports shall be signed by the responsible quality control technician and the CQC Supervisor and shall be attached to the Contractor's Daily CQC Report. When required by the technical

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

Specifications, the Contractor shall maintain statistical quality control charts.

C. Document Control

The Contractor's CQC Plan must require that Contractor-generated documents pertaining to quality related items be controlled. The following types of documents shall be on controlled distribution to ensure that changes to them are transmitted and received when applicable:

1. Manuals
2. Instructions
3. Procedures
4. Specifications
5. Drawings
6. Inspection and test Plans
7. Field change requests
8. Inspection Test and Manufacturing procedures

3.08 CORRECTIVE ACTION REQUIREMENTS

- A. The CQC Plan shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance), and shall detail what action(s) will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical Specifications.
- B. The CQC Plan shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when

DIVISION 1 — GENERAL REQUIREMENTS

Section 01450: Quality Control

a process is out of control and the type of correction to be taken to regain process control.

- C. When applicable or required by the technical Specifications, the Contractor shall establish and utilize statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

3.09 SURVEILLANCE BY THE ENGINEER

- A. All items of material and equipment shall be subject to surveillance by the Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper is maintaining an adequate quality control system in conformance with the requirements detailed herein and the applicable technical Specifications and Plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Engineer at the site for the same purpose.
- B. Surveillance by the Engineer does not relieve the Contractor of performing quality control inspections of on-site or off-site work conducted by the Contractor or by subcontractors.
- C. The Engineer may perform acceptance testing of all or portions of the Work at his/her discretion. See paragraph 1.01.D of this specification section.

3.10 NON-COMPLIANCE

- A. The Engineer will notify the Contractor of any non-compliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or his/her authorized representative to the Contractor or his/her authorized representative at the site of the work, shall be considered sufficient notice.

DIVISION 1 – GENERAL REQUIREMENTS

Section 01450: Quality Control

- B. In cases where quality control activities do not comply with either the Contractor's Quality Control Program or the Contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Engineer, the Engineer may:
 - 1. Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.
 - 2. Carry out the functions and operations of the Contractor's approved Quality Control Program. Costs incurred by the City to operate the Quality Control Program or to otherwise remedy the Contractor's non-compliance with quality-related provisions of the Contract shall be deducted from the total amount due the Contractor. This deduction shall be based on the actual cost to the City for operation of the Quality Control Program, as opposed to the amount that the Contractor may have bid initially for Quality Control services.
 - 3. Order the Contractor to stop operations until appropriate corrective actions are taken.
- C. Any failure by the Engineer to notify the Contractor of any non-compliance with any of the foregoing requirements shall not be deemed as a waiver of its enforcement rights hereunder and that the Contractor is still bound by the terms and conditions of said requirement.

PART 4 – MEASUREMENT AND PAYMENT

Contractor Quality Control is considered to be incidental to the Contract and no separate payment will be made for this work.

END OF SECTION 01450